DOCUMENT RESUME

ED 393 438 IR 017 774

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TITLE C.A.I. as a Means for Educational Justice in Primary Schools: A Greek Experience.
PUB DATE 93
NOTE 7p.; In: Verbo-Visual Literacy: Understanding and Applying New Educational Communication Media Technologies. Selected Readings from the Symposium of the International Visual Literacy Association (Delphi, Greece, June 25-29, 1993); see IR 017 742.
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Comparative Analysis; *Computer Assisted Instruction; Conventional Instruction; *Disadvantaged Youth; Elementary Education; *Equal Education; Foreign Countries; Natural Sciences; Public Schools; Science Education; *Social Background; *Student Motivation
IDENTIFIERS *Greece

ABSTRACT

This study examines the effects of computer assisted instruction (CAI) on the inequalities in education among children of less privileged backgrounds. A natural science lesson was taught to 116 children at the fifth level of the Greek primary school. Subjects went to two different public schools, one of which was in a privileged area, and the other in a less privileged area. In each school, the subjects were divided into two groups; the first group had CAI sessions (Group A), while the subjects of the other group (Group B) were taught with the traditional method of using lecture and blackboard. The subjects had no previous experience with computers in class, and neither school was equipped with computers before the experiment. Results indicate that children of less privileged backgrounds profit with the standard CAI of natural sciences more than those children of more privileged backgrounds; children of less-privileged backgrounds are more easily motivated into trying something new. Four figures illustrate the experiment outcomes. (Contains 19 references.) (AEF)

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C.A.I. AS A MEANS FOR EDUCATIONAL JUSTICE IN PRIMARY SCHOOLS: A GREEK EXPERIENCE

by
Nicos Raptis

ED 393 438

Inequalities in Education and the Use of Computers

Inequalities in the Capacity of Access to Computers

The social implications of the use of modern technology, and particularly computers, as a means of minimizing the inequalities in education is inadequately researched ground (Langouet, 1982; Lee, 1989).

Literature has always been more concerned with the established fact of the unequal distribution of computers (CE.R.I., 1986; Dubois & Schubert, 1986).

According to Dubois and Schubert (1986), there are 1.3 times more computers in the prosperous areas in the USA than in the less prosperous areas.

Authors like Lepper (1986) had written that the inequalities we notice in the capability of access to computer hardware as well as in the quality of the software being used, may potentially have an aggravating effect on the factors already generating inequalities in education and, thus, "make the rich richer and the poor poorer" (p. 14).

Other authors like Martin and Hearne (1989) report these inequalities are "to take advantage of the more gifted children" even regarding the duration of time spent on school computers, where available.

Inequalities in the capacity of access to computers can also be noticed between different countries.

Despite the lack of adequate data, it seems that the computers used in education in the developing countries are not only much fewer, but also the capability of access to them is even more unequal than in the developed countries (Abass, 1981; Bustamante, 1987; Marinho, 1987).

Criteria for the Determination of Disadvantageous Target Groups Regarding the Study of The Effect of Computer-Assisted Instruction (C.A.I.) on the Inequalities in Education

Physical and Emotional Criteria

In research carried out into the effects of CAI on the inequalities in education, several peer groups have been looked into by the standard judgement of physical and emotional disadvantages.

In a meta-analysis of twenty-six studies dealing with the use of CAI on children with special needs, Schmidt, Weinstein, Niemic, & Walberg (1985/86), showed that the use of CAI is, in general, positively connected with the improvement in school achievement of children with special needs.

Social Criteria

Regarding the studies dealing with the effects of CAI on children of different social or educational backgrounds, those of Suppes and Morningstar (1972) and Osin (1981) showed that CAI mostly favours less privileged children.

Osin (1981) reports that, owing to CAI, children performance in Arithmetic improved at rates ranging from 55% to 193%.

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The argument that CAI mostly favours children whose school achievements are below standard, has been buttressed also in the meta-analysis of Jamison, Suppes, & Wells (1974), Kulik, Bangert, & Williams (1983), Bancert-Drowns, Kulik, & Kulik (1985) and in studies such as those of Burmester and Lawson reported by Langouet (1982) and Charp (1977).

CAI and the Inequalities in Education: The 'Optimistic' and the 'Pessimistic' Scenarios

On the basis of the observations of authors such as Langouet (1982) and Stonier (1981), we could makeup two scenarios, an *optimistic* one and a *pessimistic* one, as far as the social implications of CAI are concerned.

The Optimistic Scenario

Stonier (1981) claims that:

> As the state takes on further responsibilities in education, and as education evolves into the number one industry of post-industrial economies, all homes will be provided with advanced electronic education/information systems. This will cause the gaps between various social groups to narrow substantially, perhaps disappear. (p. 854)

Reckoning that the trend toward cheaper, more powerful, and user-friendly computers will continue, Stonier connects the invariable increasing propagation of computers with an increasing equalizing outcome in education (Figure 1).

The Pessimistic Scenario

In a study of his with which the effects of educational technology on inequalities in education, as these appear when using different media is examined, Langouet (1982) reports: "We have observed that, on the one hand, *weaker* groups did not do as well as the *stronger* groups and, on the other hand, the gap kept going wilder as the teacher process became more *complicated*" (p. 16).

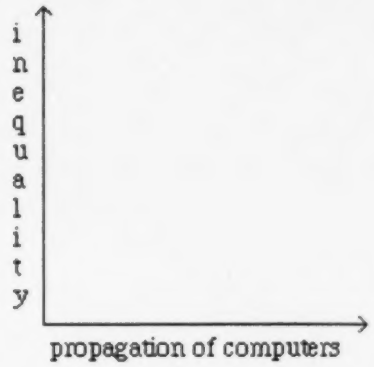

Figure 1.

Here Langouet formulates a connection between the complexity of educational process and the equalizing outcome to teaching, making up a pessimistic scenario regarding the equalizing effect of such methods as CAI on the inequalities in education.

The Question. The Hypotheses

The question we looked into during the academic year 1988/1989 was whether CAI would lessen or augment the inequalities in education as these appear among children of less privileged backgrounds. The hypotheses formulated were:

Hypothesis 1: CAI will improve the school achievement of children of a favoured background (F).

Hypothesis 2: CAI will improve the school achievement of children of a favoured background (f).

Hypothesis 3: CAI will improve the performance of children of a less privileged background more than that of the children of a privileged background.

The Experiment

In order to substantiate any one of

the hypotheses, we taught, by way of experiment, the lesson of "Researching the Natural World," which deals with the natural sciences to 116 children going to the fifth level of Greek primary school (aged from 9;6 to 10;6). The subjects of the experimental groups went to two different public schools of Thessaloniki, one of which was in a privileged area (in the center of the city), and the other one in a less privileged area (Ampelokipi).

The subjects had eight (8) CAI sessions throughout the academic year. In each session, one particular unit was taught, the way it is determined by the most rigorous, obligatory national syllabus which is found in the official coursebook.

The units taught by CAI were carefully selected in order that: (a) They were almost equally allocated throughout the academic year, and (b) they were not the easiest units in the syllabus.

In each school the subjects were divided into two groups of 24 up to 34 pupils. In each school the subjects of the first group had CAI sessions (Group A), while the subjects of the other group (Group B) were taught all the units in the traditional "talk and chalk" way (TW).

Throughout the CAI session, which lasted for 45 minutes, the subjects came into contact only with the computer and the other members of their own CAI-user's sub-group (which consisted of 2 up to 4 subjects). The subjects had no previous experience of using a computer in class, and neither school was equipped with computers before the experiment.

The computers used in the experiment were Apple IIc, while the educational software were specially developed for the experiment, in the Applesoft Basic language. The behaviouristic-type programmes involved data display, questions, simulations, and games and made use of pictures and animation. The educational software design of the behavioristic type was selected for three reasons:

1. It satisfied the need for the simple and very easy use of the computer by the subjects.

Indeed, the subjects only needed to perform nine simple and similar to each other operations in order to make use of the software. The operations involved, for example, pressing any key (so that the subject could see the *next page* in some program of data display), pressing keys *1*, *2*, or *3*, and then, possibly, the *Return* key (so that the subject could answer a multiple-choice question).

It is worth mentioning that the subjects of the CAI groups only needed one 45 minute introductory session of computer familiarization before they could continue.

2. It satisfied the need for specified time controlled CAI process, since each unit had to be thoroughly taught within 45 minutes.

3. It had been established that the major control of CAI process by the computer which is typical of the behavioristic type educational software, favours pupils of lower school achievement (Dépover, 1987; Lee, 1989).

The use of the Peters and Johnson evaluation scale showed that the educational software used in all eight sessions were academically equal.

The subject's achievement was assessed by using five tests which were made up to meet the requirements of the experiment and referred to five chapters of the coursebook (Thermal and Light Phenomena, Mechanical Phenomena, Electric and Magnetic Phenomena, Biological Phenomena-Living Organisms, Mechanical Phenomena in Liquids).

The t-test was used in order to look

into the effect of CAI on the subjects' school achievement.

The Results

The results indicated that the subjects at the less privileged (p) school profited more by CAI. The subjects' performances on the units they were taught by CAI was 51.17% higher at the p-school while at the privileged (P) school it remained the same (fell by 0.77%).

Regarding the subjects at the school in the less-privileged area, Group B (who did not have any CAI sessions) did better than Group A (who had CAI sessions), as far as the units taught in the traditional way (TW) are concerned. However, when it comes to the units which were taught using CAI, it was Group A who demonstrated better results. This conduct is uniform in all five chapters (Figure 2).

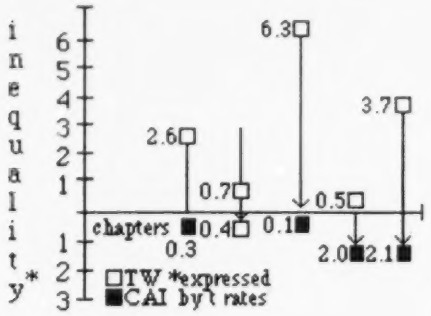

Figure 2.

Likewise, we get corresponding results when comparing the two groups who had CAI sessions at both schools (P and p). In the units taught under CAI conditions, the *Inequality Index*, as it is expressed by the rate of the t test, falls dramatically and in a uniform way, in relation to the rates it has in the units taught to both groups in the traditional way (Figure 3).

Contrary to what seems to be the case of the p-school, CAI does not seem to influence the subject's performance at the privileged P-school.

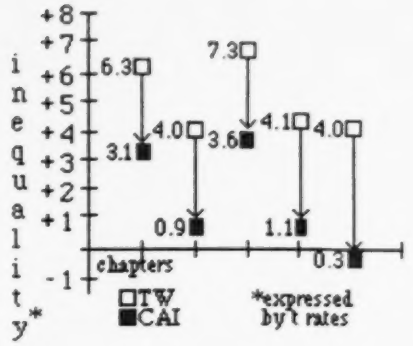

Figure 3

At this school, the performance of the Group who had CAI sessions does not present significant differentiations, in comparison to that of the Group who did not have CAI sessions, either in the units taught by computer, or in the units taught in the traditional way. The only exception is the chapters Thermal and Light Phenomena and Electric and Magnetic Phenomena, where, as it seems, the use of CAI had a negative effect on the subjects' achievements (Figure 4).

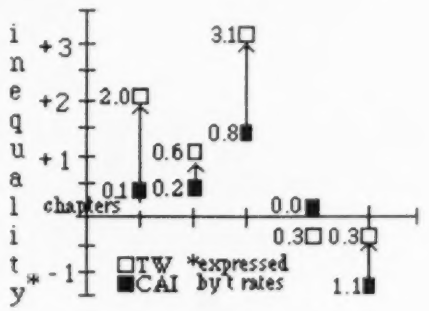

Figure 4

Conclusion/Discussion

The results of the study indicate that children of less favoured backgrounds profit with by the *standard* CAI of natural sciences more than those children of favoured backgrounds. This appears to be a uniform result and it is not influenced by the content of the lesson which is taught with the aid of a computer.

In an attempt to interpret these findings, we believe that:

Children of less-favoured backgrounds are more easily motivated into taking up something new, which will probably act as a spur to creative work.

A less prosperous/privileged area attracts less experienced teachers, with little interest in their work; teachers who will probably want to live and work there on a less permanent basis; less efficient teachers who tend to avoid using any teaching aids available (Plowden Report, 1966). This situation renders even the relatively *poor* educational software particularly effective in the less privileged areas.

Naturally, much more research needs to be carried out:

Regarding the role of educational software design in the lessening or augmentation of inequalities in education.

Regarding the effect of the computer propagation rates on the increase or not of the interest that children take in computers:

Does the similarity of the computer "to the archetype and symbol of mass culture" (CERI, 1986, p. 111) television, favour the development of children's interest in it or not?

Does the non-existence of computers in the surrounding (school, home, recreation area) of many children in large areas of Greece and other *semi-peripheral* countries, favour or not the development of the children's interest in using computers?

Could we regard the *interest in computers* and the level of *familiarity* with it as opposing or collaborating elements?

The questions above are of particular importance in countries where the bleak situation of the economy does not allow for investments in educational software, while, at the same time, the transfer of software which is in the English and French languages is hindered because of lingual, educational, and political reasons.

A lot more research still needs to be carried out before we acquire reliable data on whether the use of computers presented in this study is cost-effective in applications such as the use of CAI in small rural schools, or an increase in the number of pupils per class so that the need for new school buildings is minimized and the afternoon and evening *shifts* in certain schools are abolished.

Summary

After an overview of the literature concerning the effect of CAI on educational inequalities, here we presented a research that shows the effectiveness of a low-cost, behaviorist-designed CAI as a means for educational justice in primary Greek education.

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